

**DETERMINANTS OF FAMILY TAKAFUL IN
ASEAN: EVIDENCE FROM BUSINESS UNIT
SHARĪ'ĀH AND FULL-FLEDGED OPERATIONS**

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Abstract

This study's aim is to perform an empirical analysis of the determinants that influence the solvency of family takaful enterprises, both at the full-fledged level and within the business unit of *Shari'ah* compliant entities across countries in ASEAN. The data utilised within the study were obtained from the financial statements annually of 32 family takaful businesses and the World Bank Database, spanning 2017 to 2021. The solvency of an entity is assessed by utilising net assets divided by net contributions, which serve as the dependent variable in this context. According to the findings, a positive relationship exists between solvency and the following variables: profitability, investment ratio, liquidity, and firm size. The impact of wakalah fees on solvency is significantly related negatively. Nevertheless, it is essential to note that there is no inherent connection between GDP and inflation concerning solvency. The family takaful company in ASEAN has a relatively high solvency level. Thus, it can fulfil its obligation in the long run to meet the policyholder's claim.

Keywords: *ASEAN, Determinant Factors, Family Takaful, Solvency.*

1. Introduction

Life is full of risk, which is unpredictable by a human being. Individuals need to consider risk financing, especially for their life risks. Considering the Sharia aspects, Islamic insurance is part of risk financing for Muslims. Billah revealed that takaful, sometimes referred to as Islamic insurance, encompasses a financial arrangement wherein two parties engage in a mutual collaboration to offer financial protection to one party against unforeseen material risks.¹ The insurance penetration rate has been increasing over the years in the Association of Southeast Asia Nations (ASEAN) countries, particularly Brunei Darussalam, Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, Philippines, Singapore, Thailand, and Vietnam. According to the EU-ASEAN Business Council (EU-ABC) report, the penetration rate of ASEAN's insurance is considerable for a growing average of 6.1 per cent towards the global average.² Thus, Islamic insurance has participated in the penetration rate as well as the conventional one.



Figure 1. Market Share of Islamic Insurance in Three Members of ASEAN Countries (2015-2019)

Source: Bank Negara Malaysia, Brunei Darussalam Authority, Indonesia Financial Authority

Mutmainah, Sukmadilaga, and Nugroho state three countries involved as the most active takaful in Southeast Asia, such as Malaysia, Indonesia, and Brunei Darussalam.³ Syimee Sharifuddin et al. mentioned that the presence of Islamic insurance in Malaysia—one of the leading Islamic economies globally—was established as its first takaful (Syarikat Takaful Malaysia Sdn) in November 1984, followed by the law issued in December 1984.⁴ Meanwhile, Sharif Bashir, Hafizah, and Mail displayed the first takaful company in Brunei Darussalam on March 1993 by the Brunei Islamic Board of Trustees (TAIB) Sdn Bhd, and the government issued the order law of Islamic Insurance in 2008.⁵ PT. Asuransi Takaful Keluarga was responsible for the establishment of the inaugural takaful in Indonesia in the year 1994, and it was followed by government laws in 2014. In addition,

Thailand introduced its first Takaful by Muang Thai Life Insurance in 2011. The company has consistently extended its Takaful products among Thailand society. Each of the countries has remarkable market shares.

The figure 1 shows that Brunei Darussalam has the most significant market share in Takaful among Malaysia and Indonesia. Besides, the EU-ASEAN Business Council argues that in 2021, the ASEAN markets collectively had a notable increase of 9 per cent in the volume of insurance premiums, which exceeds the global average of 3 per cent and demonstrates superior performance compared to other significant regions and markets around the globe.⁶ Despite the observed expansion in market share, the Takaful sector has recently encountered noteworthy apprehensions over its solvency, exhibiting diminished stability compared to the traditional insurance industry. AM Best Information Services (2021) disclosed that several takaful enterprises had experienced financial failure due to several factors. Abduhand Zein Isma; Yakob et al. found factors such as exorbitant wakalah fees and operational inefficiencies.^{7,8}

Alokla et al. explained that the participants' funds had experienced deficits due to inadequate administration, elevated wakalah fees, and subpar technical performance.⁹ A market trend was discovered wherein shareholder funds consistently yielded profits, whereas policyholders' funds exhibited recurrent yearly deficits. The presence of recurring yearly deficits within the policyholders' funds contributes to the expansion of the overall cumulative deficit, diminishing the financial robustness of the Takaful organisation. Therefore, this study would like to investigate the solvency determinants in ASEAN countries, in particular Brunei Darussalam, Malaysia, and Indonesia, on Family takaful, both full-fledged and business unit sharia, from 2017 to 2021. Family takaful will be the primary concern since society requires protection for themselves or their households from losing financing when the risk comes up. Three major countries, namely Brunei Darussalam, Malaysia, and Indonesia, will be observed as three of the eleven ASEAN countries that own Islamic Insurance. Although Thailand already has the family takaful, it is not included in this study since there is no financial report published.

The result of this study will contribute to find out the elements that determine the solvency level of family takaful in ASEAN countries. These countries have an impressive market share and experience a rapid increase in insurance premiums.

The paper's structure is the following. Section 2 presents a comprehensive review of solvency and the previous empirical evidence. Section 3 will elaborate methodology used, particularly

unbalanced panel data regression. Section 4 discussed the variables regressions, empirical evidence, and discussion. Section 5 will conclude the content.

2. Literature Review

Craig defined solvency as a crucial metric utilised to showcase the capacity of an insurance firm to manage its activities over the foreseeable future effectively.¹⁰ The required solvency margin depends on the regulation of the government. Since it is the extra capital, the company must hold over and above the claims amounts they are likely to incur. Several academics have conducted a comprehensive literature study on various statistical approaches and their use in determining financial stability. Abduh and Zein Isma highlighted four precise measurements of the evaluation of the financial stability of corporate enterprises and financial institutions encompasses various aspects such as their financial performance, profitability, solvency, and efficiency—many empirical studies about solvency determinants in takaful firms by employing balanced panel data regression.¹¹ In addition, Afiqah and Laila categorised solvency as an RBC, known as a risk-based capital metric; the ratio is ascertained by the division of the solvency level by a prescribed minimum solvency level threshold.¹² Alokla et al. measured solvency using the metric of net assets divided by net contributions.¹³

Oscar Akotey et al. employ the same methodology, particularly panel regression from Ghana's ten life insurances from 2000 to 2010, to investigate the financial performance. There are three key indicators used to assess the profitability of insurers, namely investment income, underwriting profit, and net profit. The results suggest a positive correlation between the insurer's sales profitability and gross written premiums, whereas gross written premiums and investment income are negatively correlated. Furthermore, the findings indicate that life insurance companies have had significant underwriting losses as a result of engaging in excessive trading and engaging in price undercutting practices. The findings also demonstrated a contrasting rather than a supportive connection between underwriting profit and investment income in terms of their contribution to the total profitability of life insurance companies. Meanwhile, Srivastava and Ray employ linear regression and logit techniques to conduct an assessment of the financial stability of general insurance companies in India. The findings indicate that the primary determinants of Indian non-life insurers are the various lines of business, the market share held by the firm, the rate of increase in premiums, the performance of underwriting, and the claims incurred. Moreover, the elements that have the most significant impact are market share, fluctuations in the inflation rate, company size, diversity of business operations, and incurred claims.¹⁴

Abduh and Zein Isma examined the economic and firm-specific factors that impact the solvency level of family takaful firms in Malaysia. The dependent variable is the equity-to-asset and equity-to-technical reserve ratio (EAR) from 2008 to 2012. They found that investment income, contribution growth, liquidity, takaful leverage, and the Islamic equity index were found to impact EAR positively. Additionally, company size, risk retention, expenses, and profit rate have a negative impact on EAR.¹⁵ Alokla et al. evaluated the solvency of takaful enterprises operating over Gulf Cooperation Council (GCC) nations and Malaysia. A total of 52 takaful businesses were included in the dataset, spanning 2011 to 2016. The researchers discovered that the dimensions of business size and wakalah fees had a substantial impact on solvency levels. Furthermore, there is no substantial association between solvency and return on assets, risk retention, and investment ratios.¹⁶

Shiu analysed the variables influencing the solvency level of life insurance in the United Kingdom (UK). The study focused on both economic and firm-specific drivers. The individual engaged in observations during the years 1986 and 1999. The study's findings indicate a favourable correlation between solvency and the ratios of equities-to-total assets, bonds-to-total assets and the amount of new business. On the contrary, there was an inverse association between solvency and factors such as unexpected inflation, firm size, insurance leverage, market competition, and other financial ratios.¹⁷

Afiqah and Laila investigated the potential impact of firm size, the growth of premium, investment yield, and liquidity toward solvency in Takaful firms of Indonesia. The data spanning from 2015 to 2019 with 10 Takaful companies. The result showed that all the independent variables affect solvency positively.¹⁸ Yakob et al. employed a random effect model to analyse 14 conventional insurance firms and 5 Takaful enterprises in Malaysia. The data spanned from 2003 to 2007. They employ a valuation ratio as a surrogate measure for solvency on the assumption that the valuation ratio acts as an indicator of the adequacy of reserves to meet the obligations of prospective policyholders. They concluded that there exists a significant and positive relationship between investment income and solvency. Nevertheless, the aggregate advantage bestowed upon capital, in addition to the ratio of surplus, financial leverage, and liquidity, has an adverse impact on solvency. With the exception of the negative liquidity sign, the findings align with theoretical expectations as they suggest a positive relationship between investment income and the increases in total benefit paid/capital, surplus, and financial leverage.¹⁹

Prior research on insurance businesses has mostly concentrated on the UK as well as emerging economies such as the

GCC, Malaysia, India, and Ghana. Nevertheless, the number of ASEAN countries that have established takaful enterprises, including both full-fledged and *Shari'ah* compliant business units, remains low. Therefore, this study will seek to address this issue by examining the solvency levels of family takaful in three member states of ASEAN.

3. Methodology

This study selects family takaful firms, both full-fledged and business unit sharia, financial statement reports in three ASEAN countries, particularly Malaysia, Indonesia, and Brunei Darussalam. Overall, the total observations reached 32 family takaful firms. Since this study refers to the previous studies conducted by Oscar Akotey et al.; Yakob et al.; Shiu that employ panel data, this study employs unbalanced panel data as a result of missing data from the takaful enterprises. It will apply a combination of time-series and cross-sectional regression models from 2017 to 2021. The data sources utilised in this study comprise the corporation's annual reports, with the inflation and GDP statistics for each nation obtained from the World Bank Data.

The data was examined using a diagnostic test, particularly the Chow and Hausman tests, to identify what kind of model will be used; common, fixed, and random effect models. The data will be examined using the classical assumption to observe whether the problem exists. All the data estimation is proceeded by E-views software. Yakob et al. argue that the equation can represent the empirical regression model for panel data in its most basic form with some modifications to suit the econometric model within this study.²⁰

$$Y_{it} = \alpha_1 + \sum_{j=1}^k \beta_j X_{jit} + \sum_{l=1}^m \beta_l X_{lit} + \varepsilon_{it} \quad (1)$$

Y_{it} and X_{it} represent the dependent and explanatory variables for a certain family takaful firm i at a given time t . The first set of explanatory variables, represented by the symbol j , corresponds to the firm-specific factors, whereas k represents the number of firm-specific components. The second set of explanatory variables, labelled as "l," includes the market or economic factors impacting the dependent variable. The parameters that must be calculated through linear regression models are the coefficients of α_1 , β_j , and β_l . The error component, ε_{it} , follows a normal distribution.

The dependent variable is solvency which is measured by the risk-based capital. Meanwhile, the explanatory variables include profitability, investment ratio, wakalah fees, liquidity, company size, GDP, and inflation.

Explanatory variables	Measurement	Source of Data
Solvency (Y)	Net assets/net contribution	Company's annual report
Profitability (X1)	Net income/net assets	Company's annual report
Investment ratio (X2)	Investment ratio/net contribution	Company's annual report
Wakalah fees (X3)	Wakalah fees/net assets	Company's annual report
Liquidity (X4)	Current asset/current liability	Company's annual report
Company size (X5)	Ln(total company assets)	Company's annual report
GDP (X6)	\$ GDP	World Bank Database
Inflation (X7)	Inflation %	World Bank Database

Table 1. Measurement of Explanatory Variables

4. Result and Discussion

4.1 Descriptive Statistics

Takaful	Profitability	Investment Ratio	Wakalah Fees	Liquidity	Company Size	GDP	Inflation	Solvency
Mean	0.06	0.91	0.61	9.18	13.78	8.36	2.16	78.64
Median	0.03	0.17	0.20	5.77	14.05	1.04	2.48	2.75
Maximum	1.17	22.57	8.84	48.22	26.24	3.43	3.87	436.09
Minimum	-0.66	0.02	-1.70	0.50	-2.52	1.35	-3.90	-0.43
SD	0.22	2.94	1.29	9.72	4.35	4.27	1.45	383.82
Observations	157	157	157	157	157	157	157	157

Table 2. Descriptive Statistics

Table 2 presents a comprehensive overview of the dataset comprising 157 observations. The table provides key statistical measures for each variable. Since the sample size in this study is quite extensive, the company size and solvency are relatively high. The

data illustrated that the family takaful firms have successfully attracted society concerned about Sharia compliance through the rapid growth of assets and contributions.

Five diagnostic tests must be carried out to analyse the data to ensure the validity of conclusions drawn from the regression model estimation. The following diagnostic tests are; multicollinearity, heteroscedasticity, autocorrelation, and residual normality. All test results were appropriate to conduct further analysis. The detailed results of the diagnostic tests can be seen in the appendix tables.

4.2 Classical Assumption

Gujarati stated that multicollinearity is present when there exists a distinct linear relationship over the explanatory variables.²¹ Adams and Buckle revealed that Pearson's correlation coefficients test will detect the multicollinearity between the explanatory variables.²² According to the data obtained, all variables exhibit correlation coefficients greater than or equal to 0.8. Therefore, the findings imply that there is no issue of multicollinearity. Meanwhile, the purpose of the heteroskedasticity test is to determine whether there is variation in the level of inequality between observations within a regression model. The data has the probability value reached 0.1251, and the probability of each variable is greater than 0,05. Therefore, it describes that there is no heteroskedasticity.

On the other side, Durbin-Watson can identify autocorrelation. The data obtained shows $DU < DW < 4-DU$ ($1.8316 < 2.086647 < 2.1684$). It indicates no autocorrelation. For the residual normality, Bundt and Murphy explained that comparing empirical and theoretical cumulative distribution functions yields normality tests.²³ Gujarati found that each residual or error component has a regularly distributed mean of zero and variation of 2. The data obtained shows that 0.0659 exceeds 0.05. Data is typically distributed normally.

4.3 Diagnostic Test

In order to ascertain the appropriate model to employ, namely the common, random, or fixed effect model, it is essential to carry out the Chow and Hausman test. As a result, this study employs a fixed effect model after outperforming common and random effect models.

4.3.1 Fixed Effect Model

Dettoni, Norvell, and Chapman described that the outcome of the regression analysis using the fixed effect model is presented below. The observed disparities can be attributed to sampling

error.²⁴Hence, any deviation would arise from inside each individual research. Calculating the pooled estimate involves determining a weighted average, with each research being allocated a weight based on the inverse of its variance. In fixed-effect models, research of larger sample sizes is more significant than studies with smaller sample sizes.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-4.768695	1.179240	-4.043872	0.0001*
Profitability	1.280979	0.595314	2.151769	0.0335**
Investment Ratio	0.191051	0.045987	4.154435	0.0001*
Wakalah Fees	-0.495450	0.084954	-5.832009	0.0000*
Liquidity	0.043942	0.016721	2.627984	0.0098*
Company Size	0.418235	0.080347	5.205326	0.0000*
GDP	-2.35E-14	3.89E-13	-0.060414	0.9519
Inflation	-0.053861	0.101673	-0.529749	0.5973
Effects Specification				
R-squared	0.850951	Mean dependent var		1.222618
Adjusted R-squared	0.795552	S.D. dependent var		2.273476
S.E. of regression Sum	1.027973	Akaike info criterion		3.121869
Squared resid Log	119.4103	Schwarz criterion		3.962534
Likelihood	-200.5058	Hannan-Quinn criter.		3.463311
F-statistic	15.36046	Durbin-Watsonstat		2.057121
Prob (F-statistic)	0.000000			
The significance level of p-value is 10% ***, 5% ** and 1% *				

Table 4. Fixed Effect Model

The findings show that the result of the adjusted R-squared reached 0.850951. It describes that the factors can be explained by around 85.09 % from the explanatory variables to the dependent variable, while the external factors are explained from other variables by 14.91% outside this study. The explanatory variables positively affect the dependent variable simultaneously. It can be seen from the significant value of probability, which is less than 0.05. In addition, internal explanatory variables such as profitability, investment ratio, liquidity, and company size influence solvency positively and significantly at a 5% probability, excluding wakalah fees, which is negative significantly. In contrast, external factors such as GDP and Inflation do not influence solvency due to a larger than 5% probability.

The coefficient value of profitability is 1.280979, which means that when the profitability increases by 1%, it will increase solvency by 1.28%. Each increment of 1% of the investment ratio will enhance solvency by 0.19%. Each increase of 1% in the wakalah fees will decrease solvency by 0.49%. Each increase of 1% of the liquidity will increase 0.04% of solvency. Each 1% change in company size will increase 0.41% of solvency. Profitability is the primary factor that significantly influences solvency since even a 1% increase in profitability may lead to a substantial 1.28% improvement in solvency. Profitability, company size, and investment ratio are notable in determining solvency. This finding suggests an interchange between the number of customers of takaful businesses and their profitability, as measured by contributions payments or premiums. This finding suggests a positive correlation exists between the number of clients a takaful operator has and the company's profitability. As the customer base expands, the company is able to generate more profits, which in turn provides them with a larger pool of funds that may be utilised for investment purposes. As a result, the company's earnings will increase, so contributing to the expansion of its size owing to the favourable cash flow. These findings will demonstrate the high degree of solvency exhibited by takaful enterprises.

4.4 Discussion

The finding shows that profitability positively and significantly affects solvency. If the profitability increases, the solvency will increase as well. It is supported by the coefficient value that is the most contributor to solvency, reaching 1.28% for the 1% increase in profitability. The profitability improvement can be achieved through developing a marketing plan to attract more customers. The more customers they have, the more premium or contribution they will pay. It is in line with the study by (Srivastava and Ray), who found that the growing rate of premiums has a

substantial impact on non-life insurance companies in India.²⁵ The result contrasts with (Bawa and Chattha), who found that profitability does not have a relation between profitability and solvency in India's Life Insurance firms.²⁶ Meanwhile, Alokla et al. show the same result in this study, where profitability is related positively to solvency level in GCC and Malaysia takaful enterprises.²⁷

There is a favourable correlation between investment income and solvency. Browne, Carson, and Hoyt argue that increasing investment revenue could aid takaful operators in meeting their responsibilities towards policyholders.²⁸ The result found by Oscar is that investment is related positively to profitability in Ghana's Insurance firms companies.²⁹ However, this contrasts with the outcome of Alokla et al. who found that investment is not significantly associated with solvency, while liquidity and company size are positively and significantly associated with solvency in GCC and Malaysia countries.³⁰ The higher these variables, the higher the solvency will be. The magnitude size of an insurance firm could affect its capacity to execute comprehensive risk management strategies. Larger corporations possess the necessary financial means to allocate toward the acquisition of sophisticated risk assessment tools, underwriting procedures, and claims management systems. These resources enable them to effectively handle their exposure to risks and uphold elevated levels of solvency.

The finding of liquidity is related to solvency in line with the result found by Yakob et al. argued that liquidity has a significant relation to solvency in traditional life insurers and takaful companies.³¹ The finding of a positive link exists between the size of a company and its solvency. The findings align with (Afiah and Laila), who found that company size positively affects the solvency level of Takaful in Indonesia.³² However, it is in contrast with the result found by Shiu regarding the determinant factors of solvency in Insurance life firms of the UK, he found that firm size is negatively related to solvency.³³ In addition, Abduh and Zein Isma found that company size and liquidity are not associated with the equity-to-technical reserve ratio (ETR).³⁴ The result of wakalah fees has a negative influence on solvency. It is in line with the result found by (Alokla et al.), who found that wakalah fees have a negative effect on solvency. They recommend that the regulators should closely monitor the rate of wakalah fees.³⁵ In addition, the GDP and inflation rate as external factors show that they do not influence significantly. The study's outcome shows that family takaful firms in ASEAN countries play a significant role in their financial performance.

5. Conclusion

ASEAN countries are emerging markets for Islamic finance products and services. Family takaful firms are essential in protecting society from financial loss due to unpredictable risk. The financial performance of family takaful firms must own an excellent financial position. The solvency level is a proxy to gauge the financial stability of family takaful firms. The assessment of an entity's solvency involves the utilisation of the ratio of net assets to net contributions, which is considered the dependent variable within this particular context. Thus, this study investigated the determinants of solvency in family takaful, both full-fledged and business unit sharia, among ASEAN countries, particularly Malaysia, Brunei Darussalam, and Indonesia period 2017-2021.

The result from data estimating using unbalanced panel data reveals that all the explanatory variables affect positively and significantly solvency simultaneously. Profitability, investment ratio, liquidity, and company size are positively and significantly related to solvency. Wakalah fees negatively significant to solvency. However, GDP and inflation do not contain any relation to solvency. The coefficient value of each explanatory variable demonstrates that the higher 1% of profitability, investment ratio, liquidity, and company size will increase the solvency level by 1.28%, 0.19%, 0.04%, and 0.41%. The 1% change in wakalah fees will decrease solvency to 0.49%. The most significant contributor is profitability, which displays that 1% of it can enhance solvency by as much as 1.28%, followed by company size and investment ratio. It supports that the more customers takaful firms have, the more profit the company earns from its customers and the more funds they can use to invest. Consequently, all the profits will enhance the company's size due to the positive cash flow. These will reflect the good solvency level of takaful firms.

This study has profound implications for the stakeholders, particularly regulators and takaful operators in ASEAN countries, to take into consideration the wakalah fees policy. In as much as the wakalah fees play a crucial role in promoting and maintaining financial stability, as evidenced by the empirical results within this study. Hence, one potential approach to enhancing the credibility of the Takaful sector is through the oversight of the fee structure of Takaful firms.

There is some limitation in this study, which focused on family takaful in three countries, namely Brunei Darussalam, Malaysia and Indonesia, in ASEAN due to limited data available on family takaful firms' websites. Thus, the next researcher can find the data from internal family takaful firms. In addition, the next researcher can

analyse family and general takaful in ASEAN to obtain broader insight into the financial performance of takaful firms in ASEAN countries.

Appendix A: Multicollinearity

	Profita bility	Inves tment ratio	Wak alah fees	Liquid ity	Com pany size	GDP	Inflat ion
Profi tabili ty	1.000 000	0.28 7534	0.22 3085	- 0.0081 77	- 0.375 867	0.145 738	0.08 0586
Inve stme nt ratio	0.287 534	1.00 0000	0.21 3800	0.297 022	- 0.121 211	0.196 453	0.10 4540
Wak alah fees	0.223 085	0.21 3800	1.00 0000	0.016 100	- 0.043 262	- 0.1150 77	- 0.152 307
Liqu idity	- 0.0081 77	0.29 7022	0.01 6100	1.000 000	0.06 0957	- 0.2382 73	- 0.056 033
Com pany size	- 0.3758 67	- 0.121 211	- 0.043 262	0.060 957	1.00 0000	- 0.2444 15	- 0.116 360
GDP	0.145 738	0.19 6453	- 0.115 077	- 0.2382 73	- 0.244 415	1.000 000	0.44 8514
Infla tion	0.080 586	0.10 4540	- 0.152 307	- 0.0560 33	- 0.116 360	0.448 514	1.00 0000

Appendix B: Heteroscedasticity

Heteroskedasticity Test: Harvey				
F-statistic	1.65661 7	Prob. F(7,142)	0.1244	
Obs*R-squared	11.3248 0	Prob. Chi-Square(7)	0.1251	
Scaled explained SS	14.3058 6	Prob. Chi-Square(7)	0.0460	
Variable	Coeffici ent	Std. Error	t-Statistic	Prob.
C	- 0.07128 0	1.056957	- 0.067439	0.9463

Profitability	0.663468	1.034269	0.641485	0.5222
Investment ratio	0.097942	0.079105	1.238125	0.2177
Wakalah fees	0.042881	0.164894	0.260054	0.7952
Liquidity	0.025393	0.023669	1.072811	0.2852
Company size	0.080168	0.050673	1.582089	0.1159
GDP	8.57E-13	6.79E-13	1.261879	0.2091
Inflation	0.164442	0.164991	0.996671	0.3206

Appendix C Autocorrelation

R-squared	0.716339	Mean dependent var	78.64533
Adjusted R-squared	0.624990	S.D. dependent var	383.8234
S.E. of regression	235.0458	Akaike info criterion	13.96869
Sum squared resid	6519093.	Schwarz criterion	14.72789
Log-likelihood	-1057.542	Hannan-Quinn criter.	14.27703
F-statistic	7.841827	Durbin-Watson stat	2.086647
Prob(F-statistic)	0.000000		

Appendix E Residual Normality

Skewness	0.360940
Kurtosis	3.590553
Jarque-Bera	5.436641
Probability	0.065985

Appendix D Chow Test

Redundant Fixed Effects Tests			
Effects Test	Statistic	d.f.	Prob.
Cross-section F	2.204609	(31,118)	0.0013
Cross-section Chi-square	71.733882	31	0.0000

Appendix E Hausman Test

Correlated Random Effects - Hausman Test			
Test cross-section random effects			
Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	14.07609 6	7	0.0498

Notes and References

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